**What is claimed is:**

1. A sensor for determining a concentration of carbon monoxide in a gas stream as a function of a measured electrical property, said sensor comprising:
   a. a substrate, said substrate having at least a first side and a second side, said substrate being non-conductive;
   b. a first electrode, said first electrode deposited on said first side of said substrate, said first electrode adapted to conduct electricity;
   c. a second electrode, said second electrode deposited on said first side of said substrate so as to not contact said first electrode, said second electrode adapted to conduct electricity; and
   d. a sensing material, said sensing material in electrical contact with said first electrode and said second electrode, said sensing material capable of absorbing carbon monoxide from said gas stream, said sensing material having an electrical property that varies in relation to said absorbed carbon monoxide on said sensing material.
2. A sensor according to claim 1 wherein said substrate is alumina.
3. A sensor according to claim 1 wherein said first electrode is an interdigital electrode.
4. A sensor according to claim 1 wherein said second electrode is an interdigital electrode.
5. A sensor according to claim 1 wherein said sensing material is at least one metal halide.
6. A sensor according to claim 1 wherein a majority of said sensing material is cuprous chloride (CuCl).

7. A sensor according to claim 1 wherein said sensing material is comprised of a majority of cuprous chloride (CuCl) and a minority of a copper halide wherein said copper of said copper halide has a valence of at least +2.
8. A sensor according to claim 1 further comprising a heater deposited on said second side of said substrate, said heater adapted to maintain said sensor at a substantially constant temperature.
9. A sensor according to claim 8 wherein said heater is a thick-film platinum heater deposited on said second side of said substrate.
10. A sensor according to claim 1 wherein said electrical property is selected from the group consisting of: resistance, impedance, capacitance, inductance, conductance, voltage and current.
11. A method for using a sensor to determine a concentration of carbon monoxide in a gas stream, said method comprising the steps of:
    a. passing a gas stream to a sensor, said gas stream being reducing in nature and containing CO and $H_2$, said sensor comprising:
        i. a substrate, said substrate having at least a first side and a second side, said substrate being non-conductive;
        ii. a first electrode, said first electrode deposited on said first side of said substrate, said first electrode adapted to conduct electricity;
        iii. a second electrode, said second electrode deposited on said first side of said substrate so as not to contact said first electrode, said second electrode adapted to conduct electricity; and

iv. a sensing material in electrical contact with said first electrode and said second electrode, said sensing material capable of absorbing carbon monoxide from said gas stream, said sensing material having an electrical property that varies in dependence upon said absorbed carbon monoxide on said sensing material;

b. impressing a potential across said first electrode and said second electrode;

c. measuring said electrical property of said sensing material; and

d. outputting said measured electrical property to a device.

12. The method according to claim 11 wherein said device is a display device adapted to provide a read-out of said carbon monoxide concentration based upon said measured resistance.

13. The method according to claim 11 wherein said device is a controller adapted to adjust said gas stream in response to said output measurement.

14. The method according to claim 11 wherein said electrical property is selected from the group consisting of: resistance, impedance, capacitance, inductance, conductance, voltage and current.

15. A method for sensing a concentration of carbon monoxide while converting a fossil fuel into a gas stream, said method comprising the steps of:

a. reacting a flow of gases to produce a gaseous mixture of hydrogen ($H_2$), carbon dioxide ($CO_2$), carbon monoxide (CO), nitrogen ($N_2$), and water ($H_2O$);

b. directing said gaseous mixture to at least a first reactor, said at least first reactor adapted to reduce carbon monoxide content and increase said hydrogen content, thereby forming a flow of reformate gas;

c. directing said reformate gas to at least a second reactor, said at least second reactor adapted to combine a flow of air with said flow of reformate gas so as to oxidize carbon monoxide to carbon dioxide and so as to not oxidize said hydrogen to water;

d. directing said oxidized flow of air and reformate gas to a sensor, said sensor comprising:

   i. a substrate, said substrate having at least a first side and a second side, said substrate being non-conductive;

   ii. a first electrode, said first electrode deposited on said first side of said substrate, said first electrode adapted to conduct electricity;

   iii. a second electrode, said second electrode deposited on said first side of said substrate so as not to contact said first electrode, said second electrode adapted to conduct electricity; and

   iv. a sensing material in electrical contact with said first electrode and said second electrode, said sensing material capable of absorbing carbon monoxide from said gas stream, said sensing material having an electrical property that varies in dependence upon said absorbed carbon monoxide on said sensing material; and

e. providing feedback to said at least second reactor, said at least second reactor further adapted to adjust said flow of air in response to said measured concentration of said carbon monoxide.

16. A method according to claim 15 further comprising the step of: diverting said oxidized flow of air and reformate gas from said next device when said concentration of carbon monoxide detected by said sensor exceeds a threshold.

17. A method according to claim 16 wherein said next device is chosen from the group consisting of: PEM fuel cell and storage tank.

18. A method according to claim 15 further comprising the step of: directing said oxidized flow of air and reformate gas to a next device.

19. A method according to claim 18 wherein said next device is chosen from the group consisting of: PEM fuel cell and storage tank.

20. A method according to claim 15 wherein said electrical property is selected from the group consisting of: resistance, impedance, capacitance, inductance, conductance, voltage and current.

21. A sensor that can detect a concentration of carbon monoxide in a hydrogen-containing gas stream devoid of oxygen.

22. A sensor according to claim 21, wherein said concentration of carbon monoxide is between about 10 to about 2000 part per million.

23. A sensor according to claim 21, wherein said hydrogen-containing gas stream is a reformed fuel gas stream.

24. A sensor according to claim 23, wherein said reformed fuel gas stream comprises carbon monoxide, carbon dioxide, hydrogen and nitrogen.

25. A sensor for measuring a concentration of carbon monoxide in a hydrogen-containing gas stream devoid of oxygen, where said sensor comprises a metal halide that undergoes a reversible change in at least one electrical property when carbon monoxide is present.

26. A sensor according to claim 24, wherein said metal halide is copper chloride.

27. A sensor according to claim 25, wherein said at least one electrical property is resistance, impedance, capacitance, inductance, conductance, voltage or current.

28. A sensor according to claim 25 operated at a temperature to promote said reversible change in said at least one electrical property of said metal halide.